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| 10/826,601  | 04/16/2004  | Axel Brintzinger     | 2002 P 12364 US     | 1197             |
| 48154   | 7590        | 04/19/2006           | EXAMINER            |                  |
| SLATER & MATSIL LLP<br>17950 PRESTON ROAD<br>SUITE 1000<br>DALLAS, TX 75252 |             |                      | THAI, LUAN C        |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2891                |                  |

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/826,601

Applicant(s)

BRINTZINGER ET AL.

Examiner

Luan Thai

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 19-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 19-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

This Office action is responsive to the amendment filed February 10, 2006.

Claims 1-17 and 19-25 are pending in this application.

Claim 18 has been cancelled.

#### *Drawings*

1. The drawings were objected to under 37 CFR 1.83(a) in the previous Office Action and now repeated. The drawings must show every feature of the invention specified in the claims. Therefore, “a terminal of a second apparatus” in claim 1; “a printed circuit board” in claims 2 and 21; “a  $\mu$  spring” in claims 6 and 22; “a lead frame” in claims 3 and 21; and “separation corridors” in claims 9-11, must be shown or the feature(s) canceled from the claim(s).

No new matter should be entered.

#### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 4-5, 7-8, 12-13, 19-21 and 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohuchi et al. (6,573,598).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1, 2, 4-5, 7-8, 12-13, 19-21 and 23-25, Ohuchi (see specifically figures 1-12, Col. 3, line 3 to Col. 15, line 67)) disclose a method of manufacturing a module, the method comprising: providing a device (e.g., semiconductor wafer 108/208/308) that includes a connection area comprising a compliant 3D structure (104/204/304) extending over a top surface of the device, applying a casting compound (105/205/305) over the top surface of the device; after applying a casting compound, reducing a thickness of the casting compound by etching and thermal removal so that the connection area protrudes through the casting compound (see Figs. 2D, 3A, 4C, 5, 6D, 7A, 8C, 10D and 12D); and after applying a casting compound, electrically coupling the connection area to a terminal of a second apparatus (e.g., a circuit board 220/420, Figs. 3B and 7B) by soldering (107/207/307).

4. Claims 1, 2, 4-8, 12-17 and 19-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Hiatt et al. (6,673,649 of record).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1, 2, 4-8, 12-17 and 19-25, Hiatt et al. (see specifically figures 2-7) disclose a method of manufacturing a module, the method comprising: providing a device (130) including a connection area (150) extending over a top surface of the device (130), wherein the connection area comprises a compliant 3D structure (e.g., solder balls 150), dispensing a casting compound (160) over the top surface of the device (130) (figure 3B-3C), reducing a thickness of the casting compound (160) by thermal removal or etching (Col. 5, lines 66+, Col. 6, lines 2+) so

that the connection area (150) protrudes through the casting compound (160) (see figure 3E), wherein the casting compound comprises silicon-based material, thermoplastic material or epoxy resin (Col. 5, lines 40+, Col. 7, lines 1+); and after reducing the thickness of the casting compound (160), electrically coupling the connection area (150) to a terminal (122) of a second apparatus (e.g., printed circuit board 120, see figures 4-7).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi et al. (6,573,598) in view of Chakravorty (6,181,569).

Regarding claim 3, Ohuchi et al. disclose the claimed invention as detailed above except for teaching the device package (12) electrically connected to a lead frame (Ohuchi et al. do teach the device package electrically connected to the circuit board as detailed above).

Chakravorty while related to a similar Chip-sized-package design teach the external bump electrodes of the device package being electrically connected to printed circuit board or lead frame for the device package functioning as intended (Col. 1, lines 12+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select the second apparatus such as a lead frame, instead of a circuit board, for the device package of Ohuchi et al. electrically connected to since selecting a certain second apparatus (e.g., a circuit board or a lead frame) for a device package, such as the one taught by Ohuchi et al., to

electrically connected to, is held to be within the ordinary designing ability expected of a person skilled in the art and that has been taught by Chakravorty.

7. Claims 6 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi et al. (6,573,598) in view of Kurita (US 2002/0066584).

Regarding claims 6 and 22, Ohuchi et al. disclose the claimed invention as detailed above except for teaching the compliant 3D structure comprising  $\mu$  springs (Ohuchi et al. do teach the compliant 3D structure comprising solder).

Kurita while related to a similar method of manufacturing the Chip-sized-package teach (see figures 1A-1D) the compliant 3D structure comprising  $\mu$  springs (37) (see Fig. 1D) instead of the solder (32) as disclosed in Figures 1A-1C for achieving a higher density of the external terminals (paragraph [0013]). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that modifying the compliant 3D structure in Ohuchi et al.'s method by using  $\mu$  springs instead of the solder, as taught by Kurita would have been beneficial because using  $\mu$  springs as terminals of the device package helps achieving a higher density of the external terminals of the device package.

8. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi et al. (6,573,598) in view of Hsieh et al. (6,790,758 of record).

Regarding claims 14-17, Ohuchi et al. disclose the claimed invention as detailed above except for teaching the casting compound comprises silicon-based material, thermoplastic material or epoxy resin.

Hsieh et al. while related to a similar method of forming a module teach (see specifically figure 2F) dispensing a casting compound (212) over the top surface of the device (200) (figures

2F, 2G) so that the connection area (210) protrudes through the casting compound (212), wherein the casting compound comprises silicon-based material, thermoplastic material or epoxy resin (Col. 3, lines 49+); electrically coupling the connection area (210) to a terminal (306) of a second apparatus (e.g., a substrate 300, see figure 3, or a printed circuit board 106, see figure 1, Col. 1, lines 44+ and lines 59+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to apply silicon-based material, thermoplastic material or epoxy resin as the casting compound in the module manufacturing by Ohuchi et al.'s method since such materials are commonly used in the art as a casting compound formed on the active surface of a semiconductor chip or die, as taught by Hsieh et al.

9. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi et al. (6,573,598) in view of Ha et al. (6,339,251 of record).

Regarding claims 9-10, Ohuchi et al. disclose the claimed invention as detailed above except for teaching separation corridors or scribe lines exposed between the chips by a photolithographic process.

Using a photolithographic process to expose the separation corridors or the scribe lines on the wafer before dicing the wafer is commonly applied in semiconductor art as disclosed by Ha et al. (Col. 4, lines 14+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to applied the photolithographic process in combination with the method of Ohuchi et al. in order to expose the separation corridors or the scribe lines on the wafer between the chip in order to simplify the dicing step as taught by Ha et al.

10. Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi et al. (6,573,598) in view of Glenn et al. (6,420,776 of record).

Regarding claims 9 and 11, Ohuchi et al. disclose the limitations of the invention as detailed above except for a laser beam being used to expose the separation corridors or the scribe lines.

Using a laser beam to expose the separation corridors or the scribe lines on the wafer is commonly applied in semiconductor art as disclosed by Glenn et al. (Col. 5, lines 59+, Col. 7, lines 4+, Col. 8, lines 47+, Col. 10, lines 30+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to applied the laser beam to the method of Ohuchi et al. in order to expose the separation corridors or the scribe lines on the wafer since laser beam is commonly applied in the art to expose the scribe lines as taught by Glenn et al.

### ***Conclusion***

6. Applicant's arguments with respect to claims **1-17 and 19-25** have been fully considered, but they are deemed to be moot in view of the new grounds of rejection.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action because the newly added limitations (e.g., the underlined portions) to claims 1, 5 and 21-23 raise new issues that would require further consideration and/or search. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period



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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is 571-272-1935. The examiner can normally be reached on 6:30 AM - 5:00 PM, Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**Luan Thai**

Primary Examiner

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April 12, 2006